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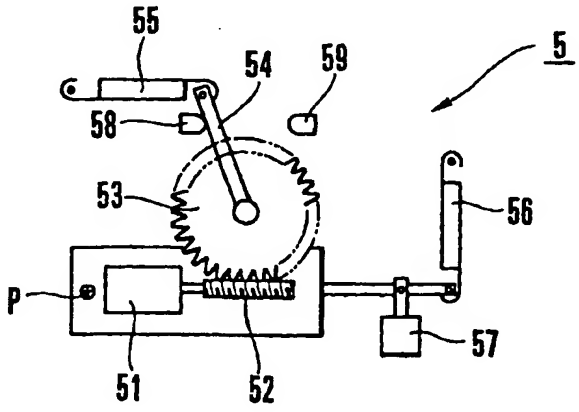
(54) Automobile headlight

(57) An automobile headlight capable of switching its light distribution pattern between by-passing mode and travelling mode repeatedly by moving any element assigned to the formation of the light distribution patterns, whose driving unit (5) comprising a first spring (55) giving pulling and maintaining power for positioning the element committing to the formation of the light distribution patterns in a passing mode, a meshing gear (52, 53) for moving the element assigned to the formation of the light distribution pattern to a traveling mode position against the pulling force of the first spring (55), a motor (51) which supplies power to drive the meshing gear (52, 53), a second spring (56) giving pulling force to an engaging direction of the meshing gear (52, 53), a solenoid (57) for releasing the engagement of the meshing gear (52, 53) against the pulling force of the second spring (56). This composition enables entire size reduction of the driving unit (5), and provides improved reliability in such a case that the motor (51) malfunctions.

FIG. 2



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Description

BACKGROUND OF THE INVENTION

Field of the Inventi n

[0001] The present invention relates to a headlight used in an automobile or other vehicles, and more particularly to a design of a headlight having a single light source like a discharge lamp which does not allow the adoption of two or more light sources in one headlight. The headlight having a single light source is capable of changing light distribution patterns between a passing mode when the automobile is passing another vehicle and a travelling mode when the automobile is travelling straight ahead, by changing a position of any part in the headlight affecting formation of light distribution patterns, such as a light source or a reflector, in accordance with driver's operations.

Discussion of the Related Art

[0002] Fig. 6 illustrates a conventional automobile headlight 90 comprising a light source 91, a reflector 94 having an aperture, a light source mounting plate 92 having a fixed end and a movable end and, a solenoid 93 connected to the movable end. Said solenoid 93 is capable of moving the light source mounting plate 92. Said mounting plate 92 can travel a circular are with the center at the fixed end when the solenoid 93 is turned on. A return spring 95 which is also connected to the movable end returns the light source mounting plate 92 to a previous position when the solenoid 93 is turned off. Light distribution patterns of the headlight 90 are switched repeatedly between the passing mode and the travelling mode by changing the position of the light source 91 relative to the reflector 94 according to movement of the light source mounting plate 92 driven by the solenoid 93.

[0003] The solenoid 93 and the return spring 95 produce predetermined forces in opposite directions to each other in order to pull the light source mounting plate 92 toward the solenoid 93 and return spring respectively. Since there are many situations which require the passing mode in current traffic, the, main position of the light source 91 is the passing mode. The solenoid 93 is turned on just during the travelling mode. When the travelling mode switches to the passing mode, the solenoid 93 is turned off, and the light source mounting plate 92 is returned to the previous position by the pulling force of the return spring 95.

[0004] Fig. 7 illustrates a construction of another conventional automobile headlight 90. The headlight 90 comprises a light source 91, a reflector 94, a light source mounting plate 92, a nut 96 connected to the light source mounting plate 92, a bolt 98 which screws through the nut 96, and a motor 97, an armature of which is connected to the bolt 98. In this design, the light source supporting plate 92 is not required to have the fixed end acting as a c nter of the partial rotation of itself, and the return spring 95 is not required either if the motor 97 is capable of repeatedly turning in or out repeatedly the predetermined portion of the bolt 98 through the nut 96.

[0005] The conventional automobile headlight 90 in Fig. 6 has the following problems. First, when the light source mounting plate 92 is moved from its passing position to its travelling position, the solenoid 93 has a high power consumption, because the light source mounting plate 92 must be driven by the solenoid 93 against the fairly strong pulling force of the return spring 95. Since the return spring 95 must maintain the light source mounting plate 92 in said main position so as to survive strong shocks or vibrations caused by a travelling car, the return spring 95 exerts a fairly strong pulling force directed toward the reflector 94 even in the main position. Second, the solenoid 93 is difficult to reduce in size, because continuous power supply is necessary while the light source mounting plate 92 is in the travelling position. The continuous power supply causes a rapid temperature rise. Taking this heat problem into account, the solenoid 92 is required to be enlarged.

[0006] The automobile headlight 90 in Fig. 7 enables reduction of its entire size and power consumption, since the driving force of the motor 97 is supported by the bolt 98 and the nut 96 and also the motor 97 is able to be turned off after the light source mounting plate 92 reached the position to be taken. The light source mounting plate 92 is not required to have the fixed end acting as a center of the partial rotation of itself. Additionally, if the motor 97 is able to perform reversal rotation, the return spring 95 is not required, either. However, the automobile headlight 90 still has the following problem. If the motor 97 fails, the light source mounting plate 92 becomes fixed and unmovable in a position when the failure of the motor 97 happened, meaning that it has a possibility to cause a safety problem in the case that the automobile passes another vehicle when the light source mounting plate 92 becomes unmovable in or on the way to a travelling position causing the dazzling of a driver in oncoming automobiles.

SUMMARY OF THE INVENTION

[0007] The present invention is directed to an automobile lamp that substantially overcomes one or more of the above problems which are due to the limitations and disadvantages of the related art.

[0008] It is an object of the invention to provide an automobile headlight enabling lower power consumption and substantial size reduction.

[0009] It is another object of the invention to provide an automobile headlight having improved safety, i.e. assuring switching to the passing mode even in case any malfunction occurs to the motor of the driving unit of

the headlight.

[0010] The above objects are achieved by providing an automobile headlight switching its light distribution pattern between passing mode and travelling mode repeatedly by moving an element assigned to the formation of the light distribution patterns, characterized by a driving unit comprising a motor which supplies power to drive a meshing gear, a first spring exerting a pulling force or power and maintaining a force for positioning the element assigned to the formation of the light distribution patterns in a passing mode, a meshing gear for moving the element assigned to the formation of the light distribution pattern to a travelling mode position against the pulling force or power of the first spring, a second spring exerting a pulling force or power to an engaging direction of the meshing gear, a solenoid for releasing the engagement of the gear against the pulling force of the second spring.

[0011] Additional objects and advantages of the invention will be set forth in part in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention will be realized and attained by means of the elements and combinations particularly pointed out in the appended claims.

[0012] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate several embodiments of the invention and together with the description, serve to explain the principles of the invention.

Fig. 1 illustrates a schematic cross sectional view of the first preferred embodiment of the present invention.

Fig. 2 illustrates a diagram showing a design of a driving unit of the first preferred embodiment of the present invention.

Fig. 3 illustrates a wiring diagram of the driving unit of the first preferred embodiment of the present invention.

Fig. 4 is a schematic cross sectional view of a driving unit of the second preferred embodiment of the present invention.

Fig. 5 illustrates a schematic cross sectional view of a driving unit of the third preferred embodiment of the present invention.

Fig. 6 illustrates a schematic cross sectional view of a conventional automobile headlight.

Fig. 7 illustrates a schematic cross sectional view of another conventional automobile headlight.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] Reference will now be made in detail to the preferred embodiments of the present invention. Whenever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0015] Fig. 1 illustrates schematically the first preferred embodiment of the present invention. The automobile headlight 1 comprises a light source 2, a reflector 4, a light source mounting plate 3, a driving unit 5 for changing the position of the light source 2 and the light source mounting plate 3 relative to the reflector 4 in order to switch the light distribution pattern between a passing mode and a travelling mode. As illustrated in Fig. 2, the driving unit 5 comprises a motor 51 which supplies power to drive a meshing gear, a worm gear 52 rotated by the motor 51, a wheel gear 53 meshing the worm gear 52 when required to do so, a lever 54 transferring the movement in accordance with the rotation of the wheel gear 53 to the light source mounting plate 3, a first spring 55 connected to the lever 54 and exerting a pulling force for moving the light source mounting plate 3 to the passing mode position, a second spring 56 hooked on a bar connected to the worm gear 52 and exerting a pulling force toward an engaging direction of the worm gear 52 and the wheel gear 53, and a solenoid 57 for releasing the engagement of the worm gear 52 and the wheel gear 53 against the pulling force of the second spring 56 when the solenoid 57 is energized or driven. The driving unit 5 further comprises a by-passing limit switch 58 and a travelling limit switch 59. When the lever 54 reaches the passing limit switch 58, the solenoid 57 is turned off, and when the lever 54 reaches the travelling limit switch 59, the motor 51 is turned off.

[0016] Fig. 3 illustrates a wiring diagram of the motor 51 and the solenoid 57. The wiring diagram comprises the motor 51, the solenoid 57, the travelling limit switch 59, the passing limit switch 58, and a light distribution pattern changing switch 10 comprising a travelling terminal 10a for the travelling mode and a passing terminal 10b for passing mode. The motor 51 is connected through the travelling limit switch 59 to the travelling terminal 10a, and the solenoid 57 is connected through the passing limit switch 58 to the passing terminal 10b.

[0017] When the light source 2 in the passing mode switches to the travelling mode, the light distribution pattern changing switch 10 is moved to the travelling terminal 10a in accordance with a car driver's operation. Then, the motor 51 starts to rotate and moves the lever 54 toward the travelling position. When the lever 54 reaches the limit switch for travelling 59, the limit switch 59 stops the operation of the motor 51. At this point in time, the light source 2 has already reached its travelling position, whereby the travelling light distribution pattern of the automobile headlight 1 is obtained.

[0018] When the light distribution pattern changing

switch 10 is turned from the travelling terminal 10a to the passing terminal 10b, the solenoid 57 starts to operate. A gear driving element including the motor 51 and the worm gear 52 rotates with a fulcrum P, and engagement of the worm gear 52 and the wheel gear 53 is released overcoming the pulling force of the second spring 56, thereby allowing the wheel gear 53 to rotate freely. Then, the lever 54 is moved toward the limit switch for passing 58 by the first spring 55, because the first spring 55 always has a pulling force toward the limit switch for passing 58. When the lever 54 reaches the limit switch for passing 58, the operation of the solenoid 57 stops. The worm gear 52 and the wheel gear 53 mesh with each other, thereby the light source 2 and the light source mounting plate 3 are fixed in their passing positions.

[0019] The operational advantages of the automobile headlight 1 according to the preferred embodiment of the present invention will now be described.

[0020] First, the automobile headlight 1 provides improved safety assuring switching to the passing mode from the travelling mode in a case where the motor 51 malfunctions and becomes unable to rotate the wheel gear 53. Even if the movement of the lever 54 stops on the way from the limit switch for passing 58 to the limit switch for travelling 59, it is prevented from dazzling a driver in another automobile when the automobile passes said another automobile if the driver switches the light distribution pattern to the passing mode, because the engagement of the worm gear 52 and the wheel gear 53 is able to be released in accordance with the driver's operation of turning the light distribution pattern changing switch to the passing terminal 10b. Additionally, the engagement of the worm gear 52 and the wheel gear 53 after the lever 54 reaches the limit switch for travelling 59 is sure to be performed, because the engagement is dependent on the pulling force of the second spring 56. Second, as described in the above, the release and engagement of the worm gear 52 and wheel gear 53 are not dependent on the operation of the motor 51. Therefore, the first spring 55 is not required to have strong pulling force to the extent of maintaining the light source mounting plate 3 in a main position surviving strong shock or vibration caused by a travelling car. It is sufficient for the first spring 55 to have the pulling force to the extent of moving the light source mounting plate 3 to its passing mode position. Accordingly, the motor 51 is also not required to have large driving power, which enables the automobile headlight 1 to have a reduced size. Third, the wiring diagram of the motor 51 is extremely simple as compared to the conventional motor 97. The conventional motor 97 is required to have a mechanism for reversed rotation, because the conventional motor 97 is used for light distribution pattern changes both from passing mode to travelling mode and from travelling mode to passing mode. In the automobile headlight 1, the motor 51 is not required to have a mechanism for reversed rotation. Fourth, the solenoid 57 is also smaller than the conventional solenoid 93. The solenoid 57 is operated only for a short period during which the light source 2 is moved from the travelling position to the passing position by the pulling power of the first spring 55. Additionally, the required power for the solenoid 57 is small to the extent of releasing the engagement of the worm gear 52 and the wheel gear 53. Therefore, entire size reduction without a heat problem is achieved.

[0021] Fig. 4 illustrates a schematic view of the driving unit of the second preferred embodiment of the present invention. The driving unit 5 has an emergency solenoid 57a. The first preferred embodiment in Fig. 2 covers the case in which any malfunction occurs to the motor 51, but it does not cover the case in which any malfunction occurs to the solenoid 57. In the second preferred embodiment, the emergency solenoid 57a covers the case in which any malfunction occurs to the solenoid 57. When the solenoid 57 malfunctions the emergency solenoid 57a is driven in accordance with a signal from a button by the driver's seat, thereby the movement of the lever 54 is continued until the lever 54 reaches the limit switch 58 for passing.

[0022] Fig. 5 illustrates schematically the driving unit of the third preferred embodiment of the present invention. In this embodiment, the second spring 56 has the pulling force toward a direction for releasing the engagement of the worm gear 52 and the wheel gear 53, and the solenoid 57 is driven when the worm gear 52 and the wheel gear 53 mesh with each other against the pulling force of the second spring 56. This embodiment provides improved reliability, because the engagement of the worm gear 52 and the wheel gear 53 is automatically released by the pulling force of the second spring 56 when any malfunction such as an electric wire breakage occurs to the solenoid 57. On the other hand, power consumption increases, because the electric power must be continuously supplied to the solenoid 57 during the travelling mode.

[0023] The operational advantages of the second and third embodiments are substantially the same as the first preferred embodiment. Selection of the embodiment may be made depending on the designing requirements such as car type, cost or technical requirements.

[0024] It will be apparent to those skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope thereof. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

1. An automobile lamp (1) capable of switching its light distribution pattern between passing mode and a travelling mode repeatedly by moving by means of a driving unit(s) any element (2) assigned to the for-

mation of the light distribution patterns, said driving unit (5) comprising:

a first spring (55) to exert a pulling and maintaining force or power for positioning the element (2) assigned to the formation of the light distribution patterns in a passing mode;
a meshing gear (52, 53) for moving the element (2) assigned to the formation of the light distribution pattern to a traveling mode position overcoming the pulling force or power of the first spring (55);
a motor (51) which supplies power to drive the meshing gear (52, 53);
a second spring (56) exerting a pulling force or power in an engaging direction of the meshing gear (52, 53);
a solenoid (57) for releasing the engagement of the meshing gear (52, 53) against the pulling force or power of the second spring (56).

2. An automobile lamp (1) capable of switching its light distribution pattern between passing mode and travelling mode repeatedly comprising an element or a light source (2), a reflector (4), a light source mounting plate (3), and a driving unit (5) comprising:

a first spring (55) to give pulling and maintaining power for positioning the element (2) causing to the formation of the light distribution patterns in a passing mode;
a lever (54) whose one end is connected to the first spring (55) and whose other end is a center of a wheel gear (53);
a limit switch for by-passing (58) in order to stop the movement of the lever (54) toward the passing mode position;
a limit switch for travelling (59) in order to stop the movement of the lever (54) toward the travelling mode position;
a meshing gear (52, 53) comprising a wheel gear (53) and a worm gear (52) for moving the lever (54) to a traveling mode position overcoming the pulling force or power of the first spring (55);
a motor (51) connected to the meshing gear (52, 53) and supplying power to drive the meshing gear (52, 53);
a second spring (56) to give pulling force or power in an engaging direction of the wheel gear (53) and the worm gear (52);
a solenoid (57) for releasing the engagement of the meshing gear (52, 53) against the pulling force or power of the second spring (56);
a gear driving element comprising the motor (51) and the worm gear (52) at whose end portion the second spring (56) and the solenoid (57) is connected.

3. An automobile lamp in claim 2, wherein the driving unit (5) comprises an emergency solenoid (57a) driven when the solenoid (57) malfunctions.

4. An automobile lamp (1) switching its light distribution pattern between passing mode and travelling mode repeatedly by moving any element (2) providing to the formation of the light distribution patterns, whose driving unit (5) comprising:

a first spring (55) giving pulling and maintaining power for positioning the element (2) committing to the formation of the light distribution patterns in a passing mode;
a meshing gear (52, 53) for moving the element (2) providing to the formation of the light distribution pattern to a traveling mode position against the pulling force or power of the first spring (55);
a motor (51) which supplies power in drive the meshing gear (52, 53);
a solenoid (57) for giving pulling force to an engaging direction of the meshing gear (52, 53);
a second spring (56) releasing the engagement of the meshing gear (52, 53) when the solenoid (57) is turned off.

FIG. 1

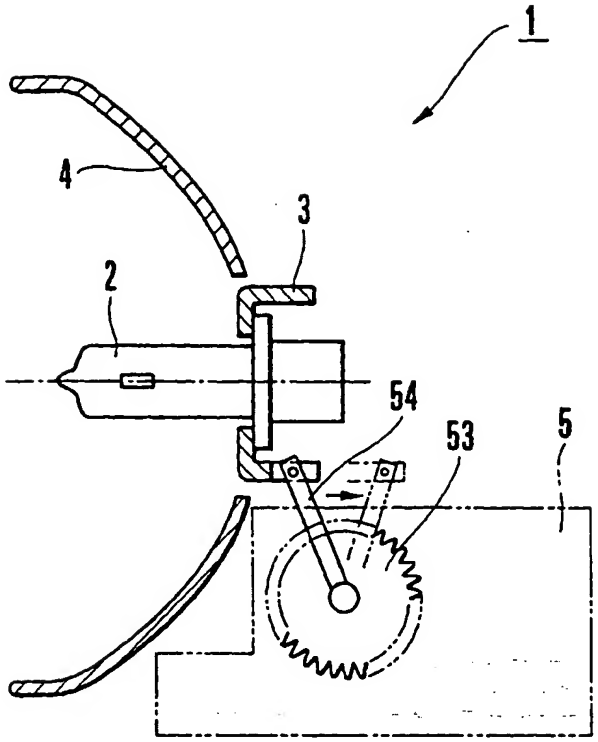


FIG. 2

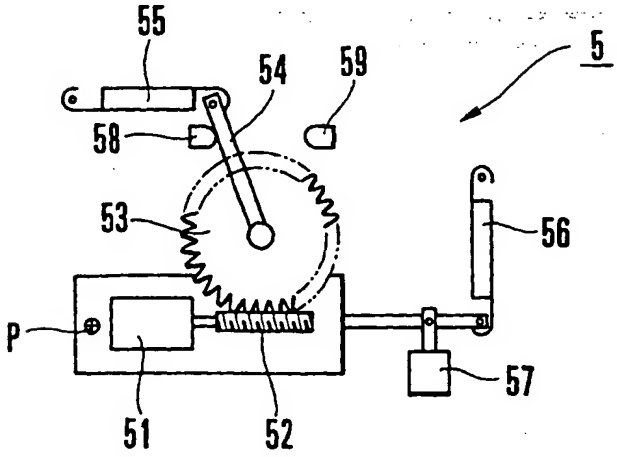


FIG. 3

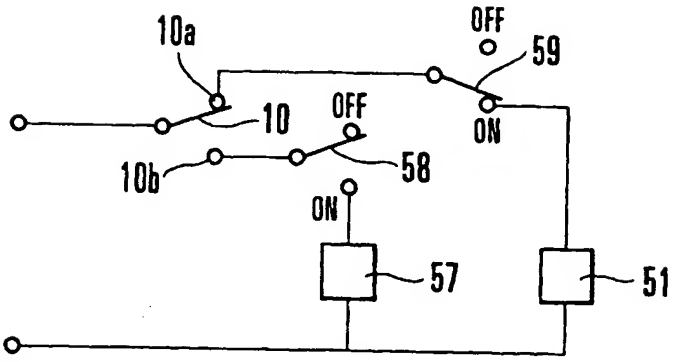


FIG. 4

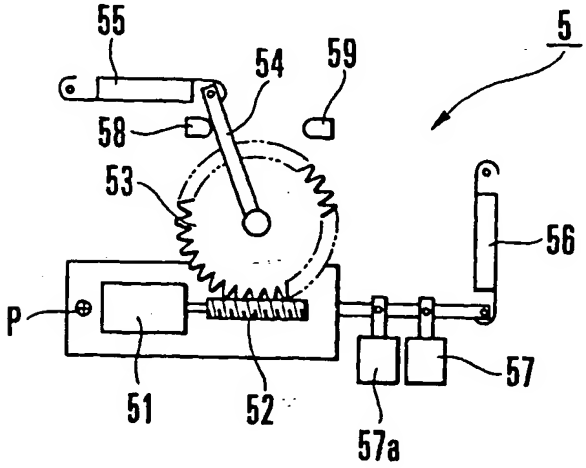


FIG. 5

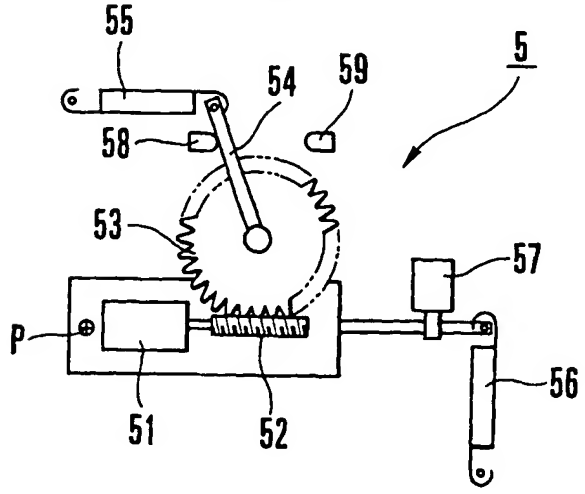


FIG.6 RELATED ART

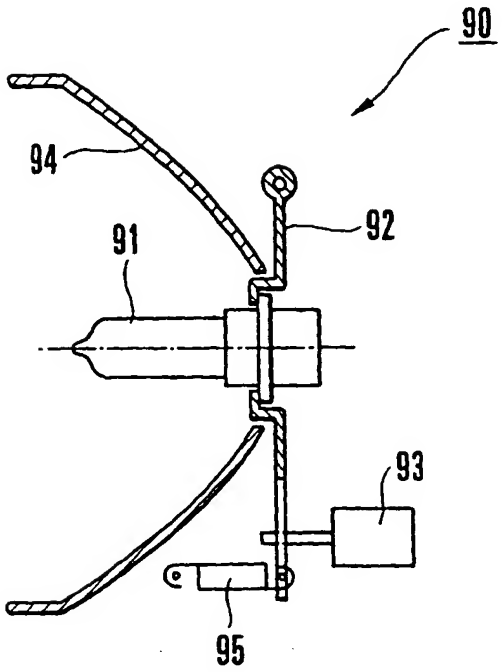
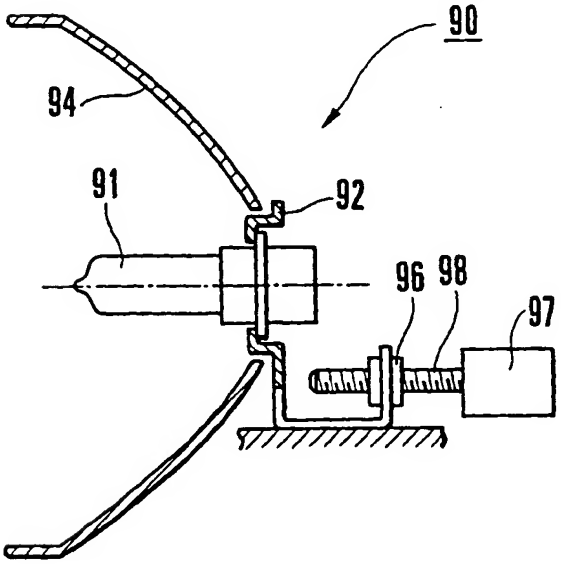


FIG.7 RELATED ART



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(54) Vehicle lamp assembly.

(57) A vehicle lamp assembly (7) includes a reflector housing (2) having a rearward face (6) including a generally annular flat (18) with a series of depressions (20,21,110). A light bulb (16) is positioned generally adjacent the reflector housing forward face (4). A bulb housing (28) providing an electrical connection for the bulb (16) has a first portion (30) inserted within the housing bore (8) and a second portion (32) contacting the reflector housing rear face annular flat (18). A generally annular retainer (34) has a first portion (36) extending through the reflector housing bore and a second portion (38,39,41) contacting the reflector housing rear face depressions (20,21,110). The retainer (34) also has an interlocking flange (43,45,47) spaced from the second portion (38,39,41) with biasing tabs (82) for retaining the bulb housing (28) within the reflector housing bore (8) and urging it against the reflector housing rear face (6). A light shield (52) has a main body portion (54) connected to an annular ring (58) by means of legs (56). The annular ring (58) contacts the forward fac (4) of the r flector housing (2); and a subarrangement connects the first portion (36) of the retainer (34) with the shield annular ring (58), thereby affixing retainer (34) and shield (52) to reflector housing (2).

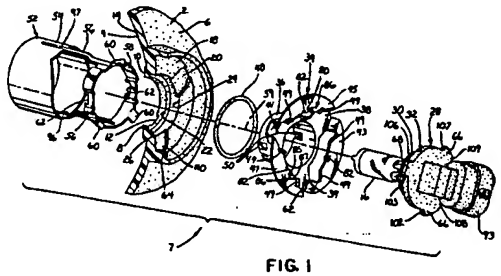

FIG. 1

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This invention relates to a vehicle lamp assembly, for example a vehicle headlamp assembly provid d with a bulb retaining arrangement for replaceable bulbs mounted in a vehicle headlamp reflector that is press-fitted through a bulb shield mounted within the reflector.

Current U.S. Government regulations require vehicle headlamps that permit the use of replaceable bulbs to have bulb retainers capable of accepting and retaining such bulbs. In order to comply with these regulations, it is also common for vehicle manufacturers to use a bulb shield to reduce the light emitted from these bulbs so as to reduce headlamp glare (uncontrolled light) to thereby meet U.S. Government specifications regarding light output from the headlamp assembly. Examples of headlamp assemblies using the above arrangements may be found in US-A-4926301 and US-A-4882606.

In some cases, it is preferred to preassemble the bulb retainer and bulb shield together, and at a later time assemble this subassembly to the headlamp reflector by inserting the shield from the rear of the reflector, through an opening (or central bore) of the reflector. This concept of preassembling the shield to the retainer for later assembly through the central bore in the housing from the rear of the reflector has implications on vehicle headlamp design and performance. One area affected is that of the central bore. With this concept, the size of the central bore restricts the size of the bulb shield to a size smaller than the central bore of the reflector housing. Regarding the central bore size, if it is too large in size, this can create problems, some of which are bulb positioning (loss of light output from bulb mispositioning), loss of reflector surface (loss of light output), opportunities for dirt entry, and other factors. If the central bore is too small, there can be a restriction in bulb shield size. Restriction of the bulb shield size can adversely affect a number of vehicle headlamp areas including shield tolerances and effectiveness, temperature buildup around the bulb, bulb life, mounting of ornamental or decorative caps to the shield, light output, headlamp quality rating, and other factors. Also, in most headlamp assemblies which use a shield and a bulb retaining device, the shield and/or bulb retainer must be affixed to the headlamp reflector with one or more fasteners.

The present invention seeks to provide an improved vehicle lamp assembly.

According to another aspect of the present invention, there is provided a vehicle lamp assembly as specified in claim 1.

The preferred embodiment can allow the shield and bulb housing retainer (hereinafter referred to as the retainer) to b affixed to the reflector housing without the utilization of fasteners and additionally can allow the use of a bulb shield which is larger than the central bore of the reflector housing without utilizing any fasteners to affix th shield to the reflector housing.

An embodiment of the present invention is described below, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is an exploded view of a preferred embodiment of headlamp assembly;

Figure 2 is a partial perspective view of a retainer of the assembly of Figure 1, shown from the front of the reflector housing;

Figure 3 is a view of the retainer of Figure 2 taken along line 3-3 of Figure 2;

Figure 4 is an exploded view of an alternative embodiment of retainer

Figure 5 is a partial view of the retainer of Figure 4 in an affixed position;

Figure 6 is a view of an embodiment of a retainer combining elements of the retainers shown in Figures 3 and 4;

Figure 7 is a partial rear elevational view of the reflector housing shown in Figure 1; and

Figure 8 is a view similar to Figure 7 for an embodiment wherein a bulb housing is rotated counterclockwise for assembly, instead of clockwise.

Referring to Figures 1 and 3, a preferred embodiment of replaceable bulb vehicle headlamp assembly 7 has a reflector housing 2 with a forward face 4 and a rearward face 6. Intersecting the forward face 4 and the rearward face 6 is an intersecting central bore 8. The reflector housing may have a far forward end (not shown) and attached lens, or the reflector housing may pivot within a housing having a fixed lens along its forward interface. The reflector housing is typically made of a mouldable polymeric material such as a mineral-filled thermoset polyester or various thermoplastic materials that may have filler materials added for improved performance in these kinds of applications. The forward face 4 of the reflector housing has an annular flat 10 with optional angularly spaced depressions 12. Additionally, the forward face 4 has a parabolic reflector surface portion 14 which is used as a reflector surface for reflecting the illumination generated by a generally adjacently positioned bulb 16, the filament of which is positioned at the focal point of the parabolic surface 14. The rearward face 6 of the reflector housing 2 has a circular flat 18 with three angularly spaced depressions 20, 21, 110 (see Figure 7). The bore 8 has a small diameter section 22 separated from a larger diameter section 24 by an annular shoulder 26.

To mount the bulb 16 and to provide for electrical connections, ther is provided a bulb housing 28. The bulb housing has a first portion 30 for

mounting the bulb 16 in the bore 8 and a second portion 32 which seats directly on the circular flat 18 of rear face 6 of the reflector housing in a manner to be described later. Additionally, the bulb housing 28 has a connector end 93 for receipt of the electrical connections which power the bulb 16.

The bulb housing 28 is held in position by a retainer 34. The retainer 34 can be fabricated from a single piece stamping. The retainer 34 has a tubular or annular first portion 36 which projects into the bore 8. Joined to the retainer first portion 36 is a second portion comprised of yokes 38, 39 and 41. The yokes 38, 39 and 41 have spaced therefrom three angularly spaced between flanges 43, 45 and 47. Each flange 43, 45 and 47 has a spring contact closed tab 82. The retainer 34 is fabricated from a 201 annealed stainless steel sheet approximately 0.51 millimetres thick.

The first portion 36 of the retainer on its extreme end has a plurality of flag or tab members 50 which can be bent outwardly.

The next member of the housing assembly 7 is a shield 52. The shield 52 has a diameter typically larger than the small diameter 22 of the bore 8. Typically, the shield 52 will be fabricated from a 301 stainless sheet metal stamping which has been rolled and welded. The main body 54 of the shield is connected by two legs 56 with an annular ring 58. The annular ring 58 has angularly spaced, radially extending feet 60. The annular ring 58 also has optional cut-out sections 62 corresponding in equal number to the tabs 50 provided on the retainer 34. In another embodiment not shown, the annular ring has a generally constant axial dimension without the cut-out sections 62.

An O-ring 48 is first placed around the first portion 36 of the retainer 34, which is then inserted within the bore 8, trapping the O-ring 48 so that it rests within the large diameter portion 24 of the reflector housing 2 and between the shoulder 26 and the yokes 38, 39 and 41. The O-ring 48 is made from an elastomeric polymeric material impregnated with a silicone lubricant. The O-ring 48 not only functions to seal the bore 8 along the periphery of the retainer first section 36 but also acts to concentrically centre the first portion 36 of the retainer within the bore 8. The retainer first portion 36 is then inserted within the bore 8, trapping the O-ring 48 between the shoulder 26 and the yokes 38, 39 and 41.

The depression 110 of the rear reflector face 6 has a small in-molded locator rib 64 which mates with a cut out 62 of the retainer to ensure the proper angular orientation of the retainer 34 with respect to the reflector housing 2.

Referring additionally to Figur 2, the bulb shield 52 is mat d with th reflector housing 2 such that its feet 60 are placed within the front face depressions 12 (or annular flat 10 if optional depressions 12 are not utilis d). This will then place the tabs 50 of the retainer into radial alignm nt with the windows 62 of the annular ring 58. A fixture (not shown) will come inside the main body 54 of the bulb shield and then extend the tabs 50 radially outward, causing an interference fit of approximately 0.3 millimetres (along the axis 59 of the bulb assembly), causing the bulb shield 52 and the retainer 34 to be affixed to one another and to the reflector housing 2. In an embodiment not shown wherein the depressions 12 and cut-out 62 are not utilised, an assembly mandril-like fixture (also not shown) will come inside the main body 54 of the bulb shield and align with grooves 97, 96 to properly position the shield 52 relative to the retainer 34. The grooves 97, 96 are both indexing features for proper bulb shield 52 orientation and strengthening features in the legs of the shield to ensure the shield remains in the proper position regardless of vehicle vibration during the vehicle operation. This mandril-like assembly fixture, after entering the main body 54 of the bulb shield 52, then extends the tabs 50 radially outward.

The bulb 16 and the bulb housing 28 will then be fitted within the retainer 34 to complete the assembly. The bulb 16 is first installed in the bulb housing 28. The bulb housing also has a groove 70 and an enclosed O-ring 72 which is a polymeric O-ring impregnated with a silicon lubricant which seals the interior of the retainer first portion 36.

The bulb housing 28 has two large ears 66 and a smaller ear 68 and in the embodiment illustrated is rotated in a clockwise direction to achieve assembly. Ears 66 are both arcuately too large to be inserted within the yoke 41, and this ensures proper orientation as shown of the bulb housing 28 in the insertion process. The above orientation places the ear 68 at approximately the ten o'clock position in Figure 1.

Lead-ins 49 ensure that the ears 68, 66 go under the flanges 45, 43 and 47 as the bulb housing 28 is pushed slightly inwardly (toward the retainer 34) and turned clockwise. A stud 98 (Figure 7) projects rearwardly from the housing rear face 18 at approximately the 9:30 position in Figure 7. This stud 98 has two key surfaces. Stud surface 100 contacts ear 68 at surface 103 to prevent the bulb housing 28 from being turned initially counterclockwise (at bulb insertion). This same stud 98 has surface 101 that acts as a stop for the ear 66 at surface 102 that stops the bulb rotation and creates the correct bulb housing 28 positioning in the reflector 2.

A stud 99 (Figur 8) can be located in a different position on the housing rear face 18 to permit counterclockwise bulb rotation for bulb insertion, should this be required for bulb clearance

to other structural or engine compartment components during initial bulb installation during headlamp manufacture or during bulb servicing. Th stud 99 has two surfaces 104, 105 that act in a similar but opposite manner to stud 98 with surfaces 101, 100. Stud 99 is the preferred embodiment for counterclockwise insertion of the bulb housing 28, should that be required by the headlamp design. With stud 99, the surface 105 contacts ear surface 106 to prevent clockwise rotation of the bulb housing. As the bulb housing is rotated counterclockwise, ear surface 107 contacts stud surface 104 to stop the bulb rotation and thereby correctly position the bulb housing 28 in the reflector 2. The retainer 34 can thus be capable of accepting bulbs that are inserted clockwise or counterclockwise without any change in the design of the retainer 34 by changing the reflector rear face 6 to have the configuration shown in Figure 7 (with stud 98) or to have the configuration shown in Figure 8 (with stud 99).

A forward face 78 (Figure 3) of the bulb housing 28 is mated directly with the flat 18 of the reflector housing rear face 6 and is rotated until the ear 66 is prevented (as mentioned previously) from further rotation by contact of bulb ear surface 102 with stud surface 101. The end series of closed tabs 82 act as contact points and cause the retainer flanges 47, 45 and 43 to act as a spring to ensure the contact of the bulb housing forward face 78 against the flat 18 of the housing rear face. The opposite corresponding open tab 86 acts as an anti-rotation feature to prevent the bulb housing 28 from vibrating (as a result of vehicle vibration) and thereby rotating back out of the retainer 34 and also prevents inadvertent removal of the bulb housing 28 from the retainer 34 after its assembly by counterclockwise rotation by contact with the end 85 with the ear 66 (lower ear 66 as shown in Figure 1). Clockwise rotation of lower ear 66 from a position angularly aligned with yoke 39 to an angular position clockwise of open end 85 of tab 86 is allowed by the ear 66 camming up the closed end 87 of the tab 86. For prevention of bulb back-out and to serve as an anti-rotation feature for counterclockwise insertion bulbs, end 80 serves in a similar fashion as end 85. End 80 contacts ear 66 at surface 109 to prevent bulb housing 28 from clockwise rotation due to vehicle-induced vibration and bulb back-out.

To remove the bulb housing 28, the bulb housing 28 must be rotated counterclockwise.

Referring additionally to Figures 4 and 5, an alternative preferred embodiment of retainer 107 is illustrated. In the alternative provision, a snap-fit connection between the retainer first portion 36 and the shi ld 52 is illustrated. In the snap-fit alternative, the flag 92 of the retainer has a snap-in depression 94, and connection of the bulb shield 52 to the retainer 34 is achieved by simply axially pushing the bulb shield over the flag 92 as shown in Figur 5. The amount of interference is typically less than that with the bent-out tag-type flag and is in the neighbourhood of 0.25 millimetres.

Referring additionally to Figure 6, a third embodiment 207 is illustrated which utilises a first portion 36 retainer and both the pop-type and the bent-out tab. The shield and the remaining elements for this embodiment are the same as previously explained.

The disclosures in United States patent application no. 08/174,538, from which this application claims priority, and in the abstract accompanying this application are incorporated herein by reference.

Claims

1. A vehicle lamp assembly comprising a reflector housing (2) including a first face (4) and a second face (6) intersected by a bore (8); a bulb (16) positionable generally adjacent the first face of the reflector housing; a bulb housing (28) capable of providing an electrical connection for the bulb and including a first portion (30) insertable within the housing bore and a second portion (32) positionable generally adjacent to the second face of the reflector housing; a generally annular retainer (34) including a first portion (36) capable of extending through the reflector housing bore and a second portion (38,39,41) capable of contacting the second face of the reflector housing, the retainer including interlocking means (43,45,47) for retaining the bulb housing within the reflector housing bore; a shield (52) for blocking a portion of illumination generated by the bulb, the shield including a contact portion (58) contacting the first face of the reflector housing; and connecting means connecting the first portion (36) of the retainer to the contact portion (58) of the shield, thereby affixing the retainer and the shield to the reflector housing.

2. A vehicle lamp assembly according to claim 1, wherein the shield includes a body portion (54) and a plurality of legs (56) extending by a first end thereof from the body portion, the contact portion including a ring (58) connected to a second end of the legs.

3. A vehicle lamp assembly according to claim 1 or 2, wherein the retainer first portion includes at least one snap-fit connection (94) engageabl with th contact portion of the shield.

4. A vehicle lamp assembly according to claim 1, 2 or 3, wherein the retain r first portion includes at least one tab (50,92) which is bent to engage the contact portion so as to interlock the shield and the retainer.

5. A vehicle lamp assembly according to any preceding claim, wherein the second face of the reflector housing is generally flat with a plurality of depressions, wherein the retainer second portion (38,39,41) is capable of fitting within the depressions and the bulb housing second portion (32) is capable of directly contacting the second face of the reflector housing.

6. A vehicle lamp assembly according to any preceding claim, including a seal (48) disposable around an outer periphery of the retainer so as radially to centre the retainer within the reflector housing bore.

7. A vehicle lamp assembly according to any preceding claim, wherein the bulb housing includes a seal (72) for centring the bulb housing within the retainer.

8. A vehicle lamp assembly according to any preceding claim, wherein the retainer interlocking means includes at least one flange (43,45,47) spaced from the second portion and spring means (82) for urging the bulb housing towards the second face of the reflector housing.

9. A vehicle lamp assembly according to any preceding claim, wherein the bulb housing can only be assembled into the retainer by rotation in a first direction; rotation in a second direction being prevented by a stud (98,99) projecting from the second face.

10. A vehicle lamp assembly according to any preceding claim, wherein the lamp assembly is a headlamp assembly.

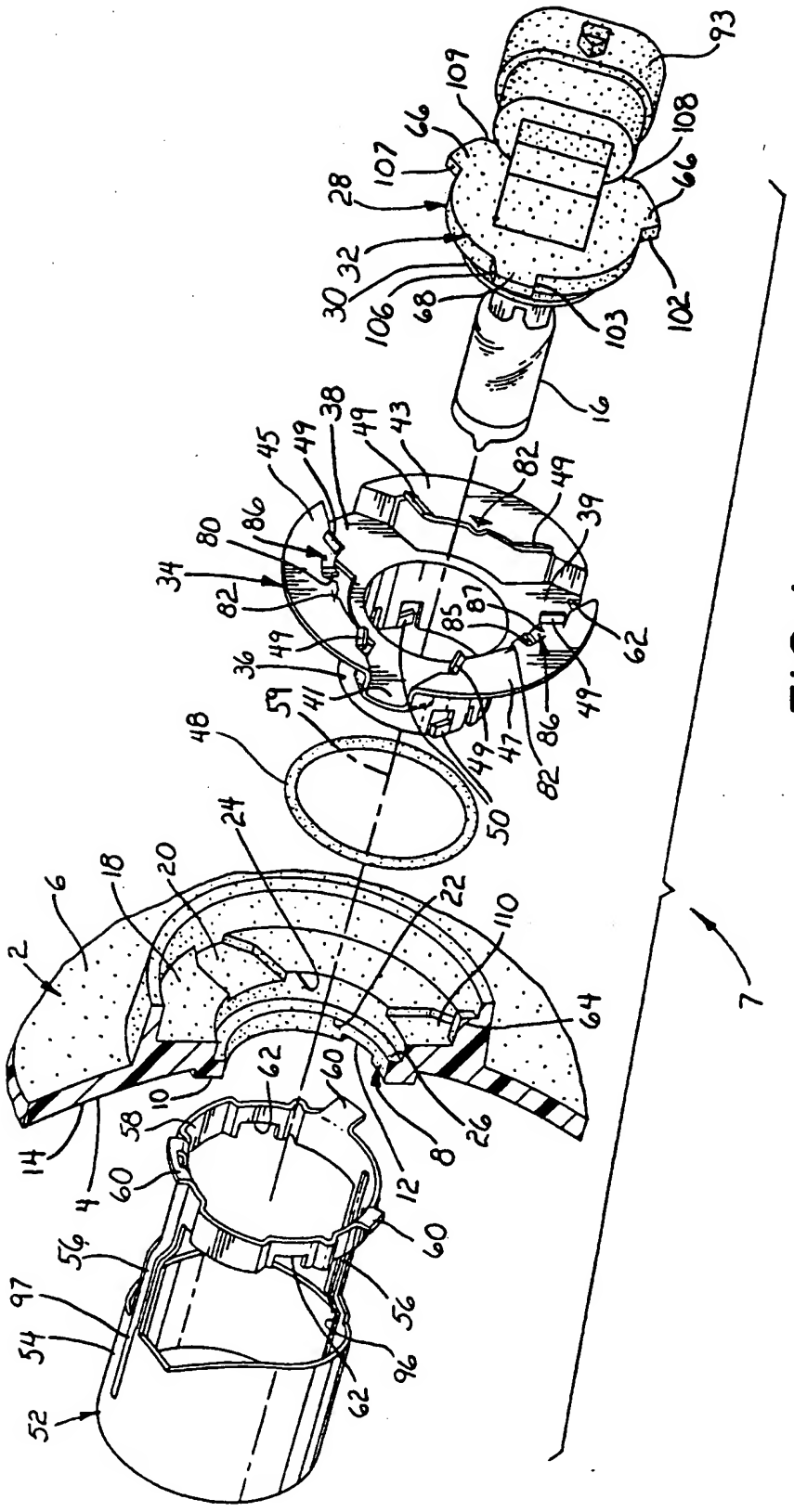
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FIG. 1

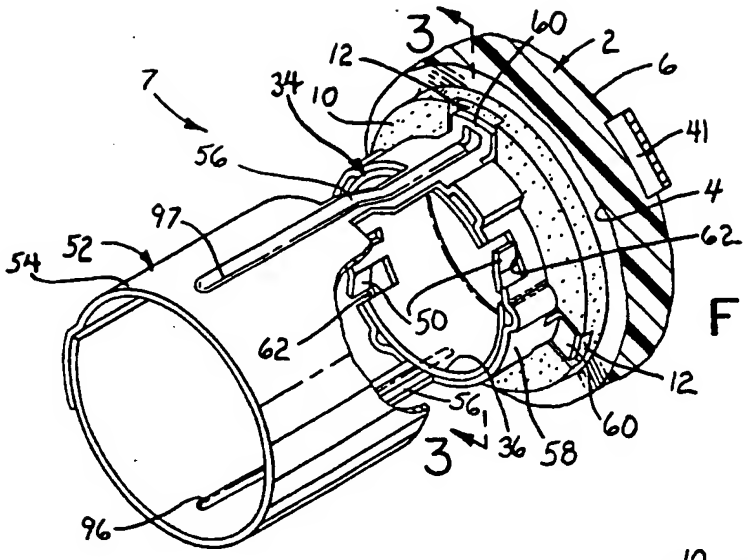

FIG. 2

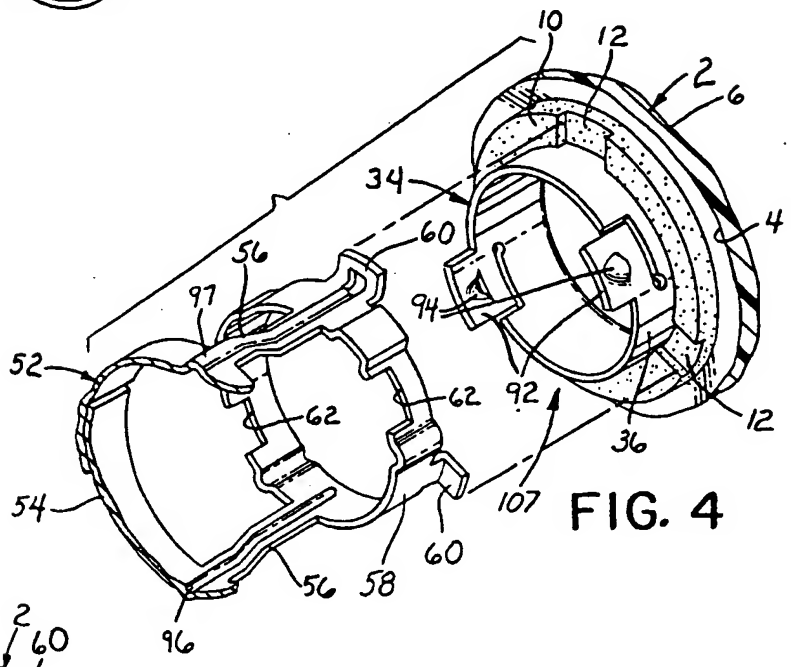

FIG. 4

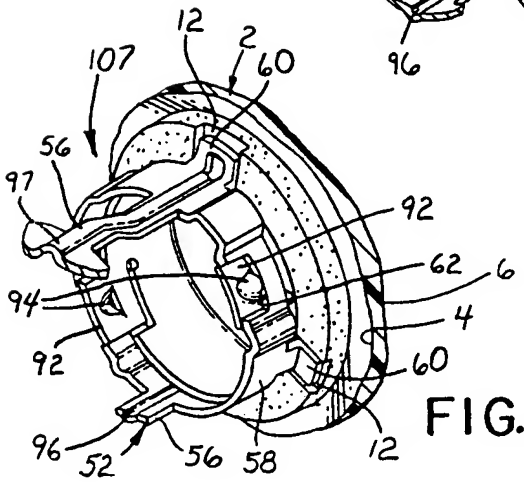

FIG. 5

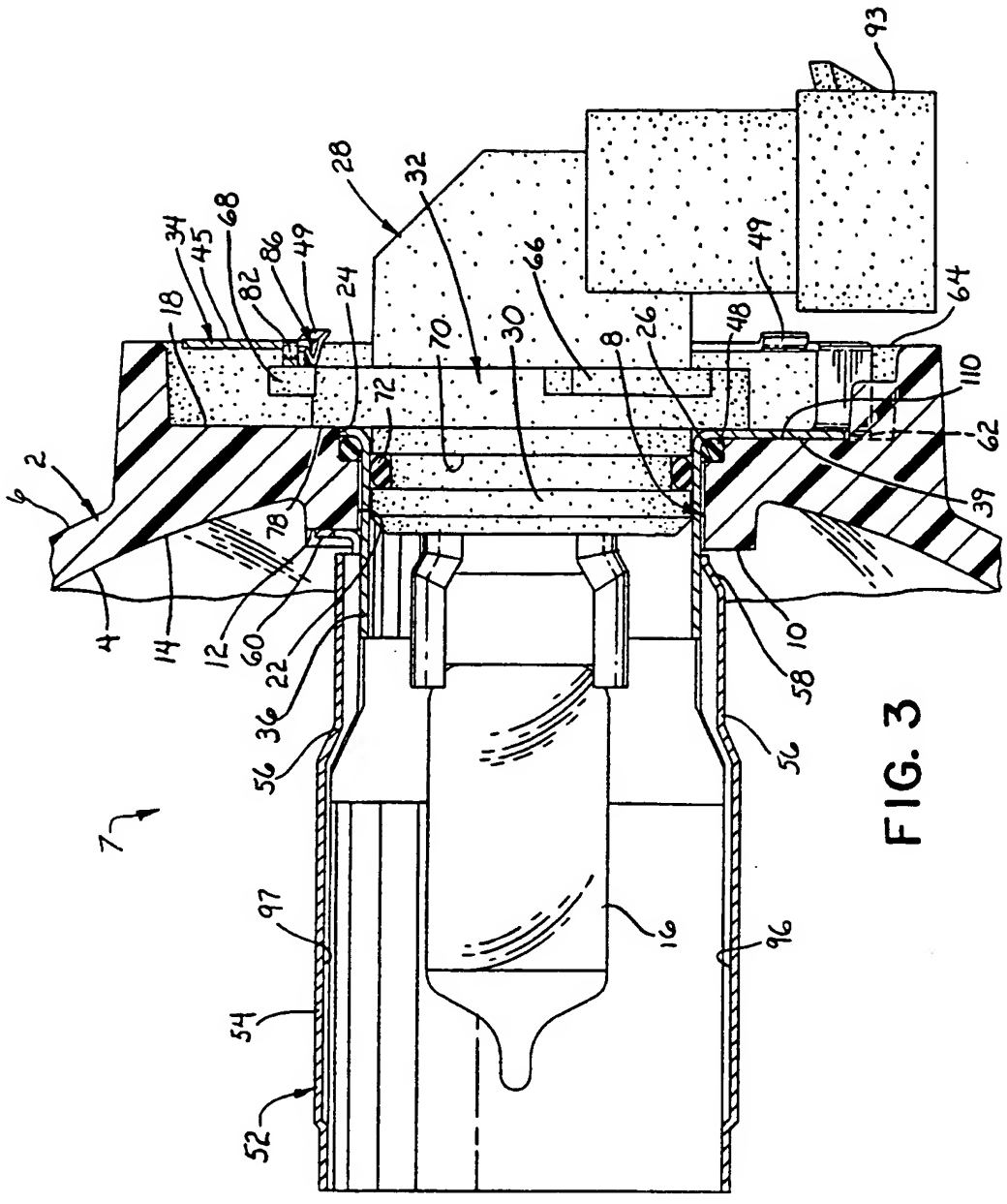
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FIG. 3

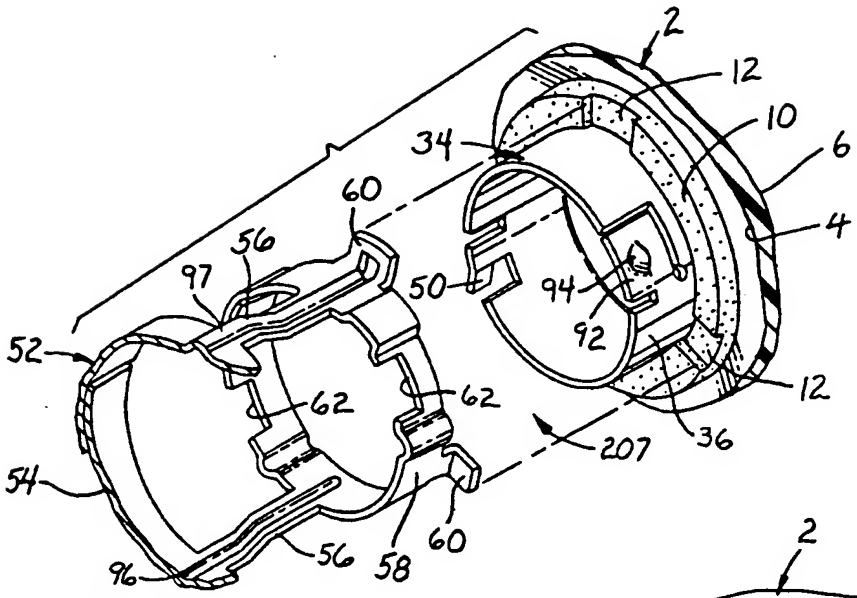

FIG. 6

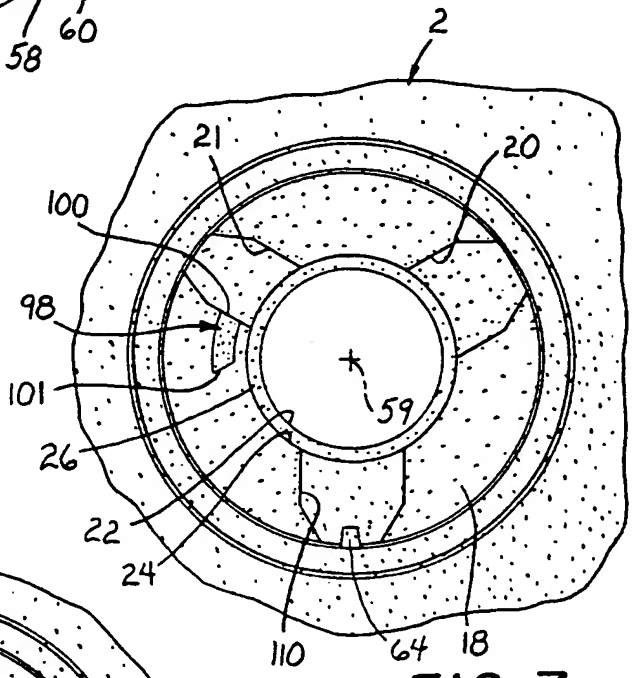

FIG. 7

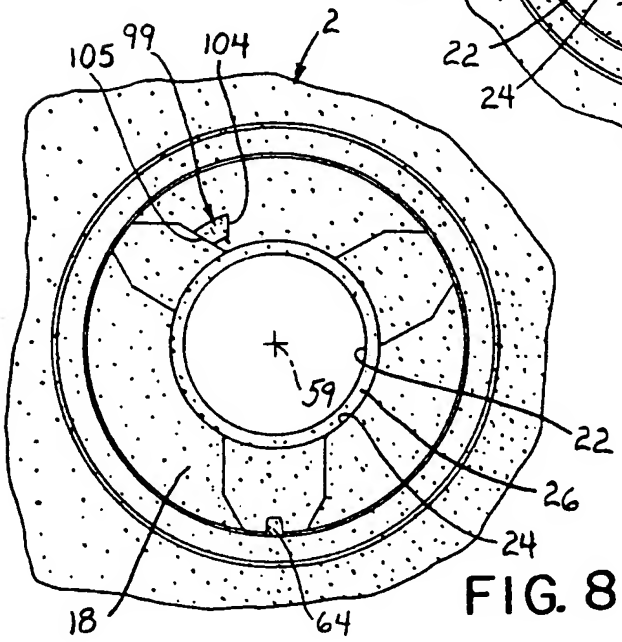

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 20 3447

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-1 184 540 (JOSEPH LUCAS INDUSTRIES LIMITED) * page 1, line 23 - line 69; figures 1-3 *	1,2,10	F21M7/00
A,D	US-A-4 882 660 (LIVERANCE ET AL.) * column 2, line 55 - line 61 * * column 3, line 21 - line 36 * * column 3, line 52 - line 66 * * column 4, line 17 - line 21 * * column 4, line 29 - line 41; figures 1-7 *	1-3,5, 7-10	
A	EP-A-0 548 555 (HELLA KG HUECK & CO.) * column 5, line 15 - line 22; claims 1,4,11; figures 1,2 *	1,3	
A	FR-A-2 638 406 (NEIMAN) * claim 1; figures 1,5 *	9	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F21M
F21Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	3 March 1995	Martin, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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特開2001－118407
（P2001－118407A）
(43)公開日　平成13年４月27日(2001.4.27)

(51)Int.Cl.'	識別記号	Ｆ Ｉ	ﾃｰﾏｺｰﾄﾞ(参考)
Ｆ２１Ｓ　8/10		Ｆ２１Ｍ　3/14	３Ｋ０４２
Ｆ２１Ｖ　11/00			

審査請求　未請求　請求項の数４　ＯＬ　（全７頁）

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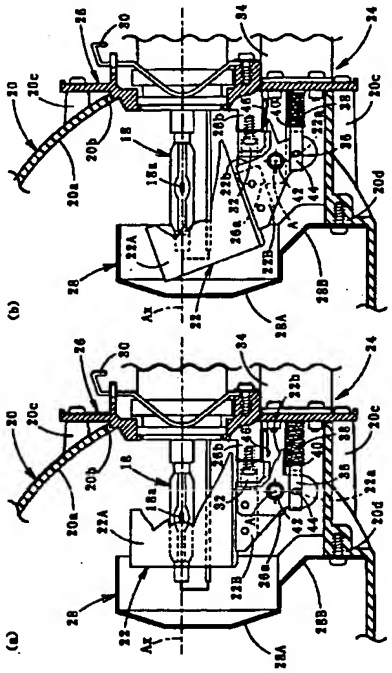
Ｆターム(参考)　3K042 AA08 AB01 AB02 AC06 BA02 BB01 BC01 BD05 BE05 BE07 CB07 CB20

(54)【発明の名称】　車両用前照灯

(57)【要約】
【課題】　可動シェードを移動させて灯具配光を変化させるように構成された車両用前照灯において、灯具組付け性を向上させるとともに光源に対する可動シェードの位置精度を高める。
【解決手段】　放電バルブ１８の放電発光部１８ａからリフレクタ２０の反射面２０ａへの入射光の一部を遮蔽可能な可動シェード２２を、シェード駆動装置２４により、入射光に対する遮蔽量が異なった値となる２位置間において回動させる構成とする。そして、放電バルブ１８をバルブ支持ベース２６を介してリフレクタ２０に固定支持せしめるとともに、バルブ支持ベース２６に可動シェード２２とシェード駆動装置２４とを取り付ける。これにより光源バルブ１８、可動シェード２２およびシェード駆動装置２４をバルブ支持ベース２６と共にユニットとして一体的に取り扱えるようにする。このユニットを予め組み付けた上でリフレクタ２０に取り付けることにより灯具組付けを容易化し、また放電発光部１８ａに対する可動シェード２２の位置精度を高める。



【特許請求の範囲】

【請求項１】　光源と、この光源からの光を前方へ反射させるリフレクタと、上記光源から上記リフレクタへ入射する光の一部を遮蔽可能な可動シェードと、この可動シェードを上記入射光に対する遮蔽量が異なった値となる少なくとも２位置間において移動させるシェード駆動装置と、を備えてなる車両用前照灯において、

上記光源を有する光源バルブが、該光源バルブを固定支持するバルブ支持ベースを介して上記リフレクタに固定支持されており、

上記バルブ支持ベースに、上記可動シェードと上記シェード駆動装置とが取り付けられている、ことを特徴とする車両用前照灯。

【請求項２】　上記バルブ支持ベースが、ダイカスト成形品で構成されている、ことを特徴とする請求項１記載の車両用前照灯。

【請求項３】　上記可動シェードの前方近傍に、該可動シェードを覆う固定シェードが設けられており、

この固定シェードが、上記バルブ支持ベースに固定支持されている、ことを特徴とする請求項１または２記載の車両用前照灯。

【請求項４】　上記リフレクタの一部が該リフレクタの残りの部分から分離して形成されており、

上記リフレクタの一部が上記バルブ支持ベースと一体的に形成されている、ことを特徴とする請求項１～３いずれか記載の車両用前照灯。

【発明の詳細な説明】

【発明の属する技術分野】本願発明は、可動シェードを移動させて灯具配光を変化させるように構成された車両用前照灯に関するものである。

【従来の技術】車両用前照灯は、光源からの光をリフレクタで前方へ反射させてロービーム用またはハイビーム用のビームを照射するようになっているが、ロービームとハイビームとでは要求される配光パターンが異なるので、２つの光源を有する光源バルブあるいは２つの光源バルブを用い、その点灯切換えを行うことによりロービームとハイビームとのビーム切換えを行うのが一般的である。しかしながら単一の光源でビーム切換えを行うように構成された車両用前照灯も知られている。特に、光源バルブとして放電バルブを用いた２灯式前照灯においては、このような構成とせざるを得ない場合が多い。光源が単一である場合におけるビーム切換え方法の１つとして、従来より可動シェードを移動させてビーム切換えを行う方法が知られている。この方法では、シェード駆動装置により可動シェードを、光源からリフレクタへの入射光に対する遮蔽量が異なった値となる２位置間において移動させるようになっている。

【発明が解決しようとする課題】しかしながら、上記従来のシェード駆動装置を備えた車両用前照灯においては、可動シェードをリフレクタに移動可能に取り付ける一方、シェード駆動装置をリフレクタに取り付け、さらにこれら可動シェードおよびシェード駆動装置を連結する必要がある。このため灯具組付け性が悪く、かつ光源に対する可動シェードの位置精度を高めることが容易でないという問題がある。このような問題は、可動シェードを移動させてロービームとハイビームとのビーム切換えを行う場合だけでなく、可動シェードを移動させて灯具配光を変化させるようにした場合一般に生じる問題である。本願発明は、このような事情に鑑みてなされたものであって、可動シェードを移動させて灯具配光を変化させるように構成された車両用前照灯において、灯具組付け性を向上させることができ、かつ、光源に対する可動シェードの位置精度を高めることができる車両用前照灯を提供することを目的とするものである。

【課題を解決するための手段】本願発明は、所定のバルブ支持ベースを用いることにより、上記目的達成を図るようにしたものである。すなわち、本願発明に係る車両用前照灯は、光源と、この光源からの光を前方へ反射させるリフレクタと、上記光源から上記リフレクタへ入射する光の一部を遮蔽可能な可動シェードと、この可動シェードを上記入射光に対する遮蔽量が異なった値となる少なくとも２位置間において移動させるシェード駆動装置と、を備えてなる車両用前照灯において、上記光源を有する光源バルブが、該光源バルブを固定支持するバルブ支持ベースを介して上記リフレクタに固定支持されており、上記バルブ支持ベースに、上記可動シェードと上記シェード駆動装置とが取り付けられている、ことを特徴とするものである。上記「光源」の種類は特に限定されるものではなく、例えば、放電バルブの放電発光部であってもよいし、ハロゲンバルブ等の白熱バルブのフィラメント等であってもよい。上記「可動シェード」は、光源バルブからリフレクタへの入射光の一部を遮蔽可能なものであれば、その具体的構成は特に限定されるものではない。上記「入射光に対する遮蔽量が異なった値となる少なくとも２位置」は、２位置のみであってよいし３箇所以上の位置であってもよく、また、該位置に可動シェードが位置することによりロービーム用配光パターンまたはハイビーム用配光パターンを形成するような位置を含むものであってもよいし、含まないものであってもよい。上記「シェード駆動装置」は、可動シェードを上記少なくとも２位置間において移動させるように構成されたものであれば、特定の駆動装置に限定されるものではなく、例えばソレノイドを用いたもの、パルスモータを用いたもの等が採用可能である。また、このシェード駆動装置による可動シェードの「移動」の態様についても特に限定されるものではなく、例えば、回動、直線往復動等が採用可能である。上記「バルブ支持ベース」は、光源バルブが固定支持されるとともに可動シェードおよびシェード駆動装置が取り付けられた状態でリフレクタに固定支持されるように構成されたものであれば、

その具体的構成は特に限定されるものではない。

【発明の作用効果】上記構成に示すように、本願発明に係る車両用前照灯は、光源からリフレクタへ入射する光の一部を遮蔽可能な可動シェードを、入射光に対する遮蔽量が異なった値となる少なくとも２位置間において移動させるシェード駆動装置を備えているが、上記光源を有する光源バルブがバルブ支持ベースを介してリフレクタに固定支持されており、このバルブ支持ベースに可動シェードとシェード駆動装置とが取り付けられているので、光源バルブ、可動シェードおよびシェード駆動装置をバルブ支持ベースと共にユニットとして一体的に取り扱うことができる。したがって、このユニットを予め組み付けた上でリフレクタに取り付けるようにすれば灯具組付けを容易に行うことができ、また、光源に対する可動シェードの位置精度を高めることができる。このように本願発明によれば、可動シェードを移動させて灯具配光を変化させるように構成された車両用前照灯において、灯具組付け性を向上させることができ、かつ、光源に対する可動シェードの位置精度を高めることができる。上記バルブ支持ベースの具体的構成が特に限定されないことは上述したとおりであるが、これを寸法精度および強度に優れたダイカスト成形品で構成すれば、光源に対する可動シェードの位置精度を一層高めることができる。また上記構成において、可動シェードの前方近傍に該可動シェードを覆う固定シェードを設けるようにすれば、可動シェードおよびその周辺構造を灯具外部から見えにくくすることができ、その際、固定シェードをバルブ支持ベースに固定支持せしめるようにすれば、灯具組付け性を向上させることができる。さらに上記構成において、リフレクタの一部を該リフレクタの残りの部分から分離して形成し、このリフレクタの一部をバルブ支持ベースと一体的に形成するようにしてもよく、このようにすればバルブ支持ベースをリフレクタの残りの部分に対して広い領域を利用して固定支持することができるので、これにより灯具光学系の位置精度を高めることができる。

【発明の実施の形態】以下、図面を用いて、本願発明の実施の形態について説明する。図１は、本願発明の一実施形態に係る車両用前照灯を示す側断面図であり、図２は、図１のII部詳細図であり、図３は、そのIII 方向矢視図である。図１に示すように、本実施形態に係る車両用前照灯１０は、レンズ１２とランプボディ１４とで形成される灯室内に、リフレクタユニット１６が図示しないエイミング機構を介して上下方向および左右方向に傾動可能に設けられてなっている。リフレクタユニット１６は、放電バルブ（メタルハライドバルブ）１８と、リフレクタ２０と、可動シェード２２と、シェード駆動装置２４と、バルブ支持ベース２６と、固定シェード２８とを備えてなっている。レンズ１２は素通しレンズであって、リフレクタユニット１６に配光制御機能が付与されている。すなわち、リフレクタ２０は、放電バルブ１８の放電発光部１８ａ（光源）からの光を前方へ反射する反射面２０ａを有しており、該反射面２０ａの拡散あるいは偏向反射機能により、所定の配光パターンを形成するビームを前方に照射するようになっている。放電バルブ１８は、バルブ支持ベース２６を介してリフレクタ２０に固定支持されている。すなわち、このバルブ支持ベース２６は、ダイカスト成形品で構成されており、リフレクタ２０の後頂開口部２０ｂに後方から挿入された状態で、リフレクタ２０の背面の複数箇所に設けられたボス２０ｃにネジ締め固定されている。そして放電バルブ１８は、このバルブ支持ベース２６に線バネ３０により固定支持されている。その際、放電バルブ１８の放電発光部１８ａがリフレクタ２０の光軸Ａｘ上に位置決めされるようになっている。可動シェード２２は、後端縁が複雑な凹凸形状に形成された筒状のシェード本体２２Ａと、このシェード本体２２Ａの下端部から下方へ向けてやや後方寄りに延びる板状のステー２２Ｂとがリベット固定されてなっている。この可動シェード２２は、シェード駆動装置２４により、図２（ａ）に示すロービーム構成位置と、同図（ｂ）に示すハイビーム構成位置とを取り得るようになっている。そして、この可動シェード２２は、ロービーム構成位置では、シェード本体２２Ａにより、放電バルブ１８の放電発光部１８ａからリフレクタ２０の反射面２０ａへ入射する光の一部を遮蔽して、ロービームでの照射に必要な光だけを反射面２０ａへ入射させる一方、ハイビーム構成位置では、シェード本体２２Ａによる反射面２０ａへの入射光の遮蔽量を減らして、ハイビームでの照射に必要な光量を確保するようになっている。シェード駆動装置２４は、リフレクタ２０の光軸Ａｘの下方においてバルブ支持ベース２６にネジ締め固定されたソレノイド３４と、このソレノイド３４の可動鉄芯３６に装着され、該可動鉄芯３６を非励磁位置へ向けて付勢するリターンスプリング３８とを備えてなっている。可動鉄芯３６は、その中間部に、リターンスプリング３８の前端部に当接して該リターンスプリング３８の弾性付勢力を受け止めるＥリング４０が装着されており、またその先端部は左右二又状に形成されている。可動シェード２２は、そのステー２２Ｂの中間部において、バルブ支持ベース２６から前方へ突出するように形成された支持ブラケット２６ａに軸部材４２を介して、左右方向に延びる回動軸線Ａ回りに回動可能に支持されている。なお、ステー２２Ｂと支持ブラケット部２６ａとの間には環状スペーサ４８が装着されており、これによりステー２２Ｂと軸部材４２との連結部のガタ発生を最小限に抑えるようになっている。また、可動シェード２２は、そのステー２２Ｂの下端部において、可動鉄芯３６の先端部にピン４４を介して連結されている。この連結は、可動鉄芯３６の二又状に形成された先端部でステー２２Ｂの先端部を左右両側から挟んだ

状態で、ピン４４を左右方向に貫通させて可動鉄芯３６の先端部に固定することにより行われている。ステー２２Ｂの先端部には、ピン４４を挿通させる長孔２２ａが上下方向に延びるようにして形成されており、これにより可動シェード２２の回動に伴う軸部材４２およびピン４４間の距離変化を吸収するようになっている。バルブ支持ベース２６における支持ブラケット２６ａの基端部近傍部位には、前方へ突出する突起部２６ｂが形成されている。この突起部２６ｂには、変位規制ブロック３２が変位規制バネ４６を介して前方からネジ締め固定されている。この変位規制ブロック３２は、打音が発生しにくい樹脂製（例えばフッ素系樹脂製）の部材からなり、その前端面から下端面にかけてＶ字溝が形成されている。シェード駆動装置２４によるロービームとハイビームとのビーム切換えは、次のようにして行われるようになっている。すなわち、シェード駆動装置２４のビーム切換えスイッチ（図示せず）がオフのときには、ソレノイド３４の可動鉄芯３６が非励磁状態にあるため、リターンスプリング３８の弾性付勢力により可動鉄芯３６が前方へ移動し、これにより可動シェード２２のステー２２Ｂが変位規制ブロック３２の前端面に当接する位置まで回動軸線Ａ回りに後方へ回動し、図２（ａ）に示すロービーム構成位置に固定される。一方、ビーム切換えスイッチのオンによりソレノイド３４の可動鉄芯３６が励磁されると、可動鉄芯３６が後方へ移動するため、可動シェード２２のステー２２Ｂが変位規制ブロック３２の下端面に当接する位置まで回動軸線Ａ回りに前方へ回動し、図２（ｂ）に示すハイビーム構成位置に固定される。可動シェード２２がロービーム構成位置あるいはハイビーム構成位置へ回動したときには、そのステー２２Ｂの端面２２ｂが該Ｖ字溝の底面に当接するが、その際、該Ｖ字溝の両側壁面によりステー２２Ｂの左右変位が規制され、これにより車両走行中の振動等により可動シェード２２が前後方向あるいは左右方向にブレるのが防止される。また、バルブ支持ベース２６の突起部２６ｂの前端部に嵌着された変位規制バネ４６は、該突起部２６ｂの下面に沿って略Ｕ字状に延びるように形成されており、可動シェード２２がハイビーム構成位置へ回動したときにステー２２Ｂの端面２２ｂに当接して弾性変形するようになっている。そしてこれにより、ビーム切換え時の無用な打音発生を防止するとともに、ステー２２Ｂと軸部材４２との連結部や、ステー２２ＢとソレノイドＳ４の可動鉄芯３６との連結部のガタ、さらには可動鉄芯３６自体のガタを吸収するようになっている。可動シェード２２の前方近傍には、該可動シェード２２を覆う固定シェード２８が設けられている。この固定シェード２８は、縦長の長円形状に形成されたキャップ状のシェード本体２８Ａと、このシェード本体２８Ａの下端部から下方へ向けてやや後方寄りに延びる断面コ字状のステー２８Ｂとが一体形成されてなっている。そして、この固定シェード２８は、そのステー２８Ｂの下端部においてリフレクタ２０にネジ締め固定されている。リフレクタ２０における反射面２０ａの下端部には、シェード固定用座部２０ｄが突出形成されている。以上詳述したように、本実施形態に係る車両用前照灯１０は、放電バルブ１８の放電発光部１８ａからリフレクタ２０の反射面２０ａへの入射光の一部を遮蔽可能な可動シェード２２を、入射光に対する遮蔽量が異なった値となる２位置間において回動させるシェード駆動装置２４を備えているが、上記放電バルブ１８はバルブ支持ベース２６を介してリフレクタ２０に固定支持されており、このバルブ支持ベース２６に可動シェード２２とシェード駆動装置２４とが取り付けられているので、光源バルブ１８、可動シェード２２およびシェード駆動装置２４をバルブ支持ベース２６と共にユニットとして一体的に取り扱うことができる。したがって、このユニットを予め組み付けた上でリフレクタ２０に取り付けるようにすれば灯具組付けを容易に行うことができ、また、放電発光部１８ａに対する可動シェード２２の位置精度を高めることができる。特に本実施形態においては、バルブ支持ベース２６が寸法精度および強度に優れたダイカスト成形品で構成されているので、放電発光部１８ａに対する可動シェード２２の位置精度を一層高めることができる。また本実施形態においては、可動シェード２２の前方近傍に該可動シェード２２を覆う固定シェード２８が設けられているので、可動シェード２２およびその周辺構造（すなわち、可動シェード２２のバルブ支持ベース２６への支持構造、および可動シェード２２とソレノイド３４の可動鉄芯３６との連結構造）を灯具外部から見えにくくすることができる。次に、本実施形態の変形例について説明する。図４は、本実施形態の第１変形例を示す、図１と同様の図である。図示のように、本変形例においては、固定シェード２８が、リフレクタ２０ではなくバルブ支持ベース２６の下端部にネジ締め固定されている。これを実現するため固定シェード２８のステー２８Ｂは後方へ延びている。そして、リフレクタ２０の下端部には段部２０ｅが形成されており、この段部２０ｅによりステー２８Ｂを下方から支持するようになっている。本変形例のように固定シェード２８をバルブ支持ベース２６に固定支持せしめることにより、固定シェード２８が設けられている場合においても灯具組付け性の向上を図ることができる。図５は、本実施形態の第２変形例を示す、図１と同様の図である。図示のように、本変形例においては、リフレクタ２０における光軸Ａｘ寄りの中心部２０Ａ（一部）が、リフレクタ２０の周辺部２０Ｂ（残りの部分）から分離して形成されている。リフレクタ２０の中心部２０Ａは、バルブ支持ベース２６と一体的に形成されている。そして、バルブ支持ベース２６は、リフレクタ２０の中心部２０Ａの外周縁部から延長形成されたフランジ部２６ｃにおいて、リフレクタ２０

の周辺部２０Ｂの背面の複数箇所に設けられたボス２０ｃにネジ締め固定されている。また本変形例においても、固定シェード２８はバルブ支持ベース２６の下端部にネジ締め固定されている。本変形例のように、リフレクタ２０の中心部２０Ａをその周辺部２０Ｂから分離してバルブ支持ベース２６と一体的に形成することにより、バルブ支持ベース２６をリフレクタ２０に対して広い領域を利用して固定支持することができ、これにより灯具光学系の位置精度を高めることができる。また、本変形例においても、固定シェード２８がバルブ支持ベース２６に固定支持されているので、固定シェード２８が設けられている場合の灯具組付け性向上を図ることができる。

【図面の簡単な説明】

【図１】本願発明の一実施形態に係る車両用前照灯を示す側断面図

【図２】図１のII部詳細図

【図３】図１のIII 方向矢視図

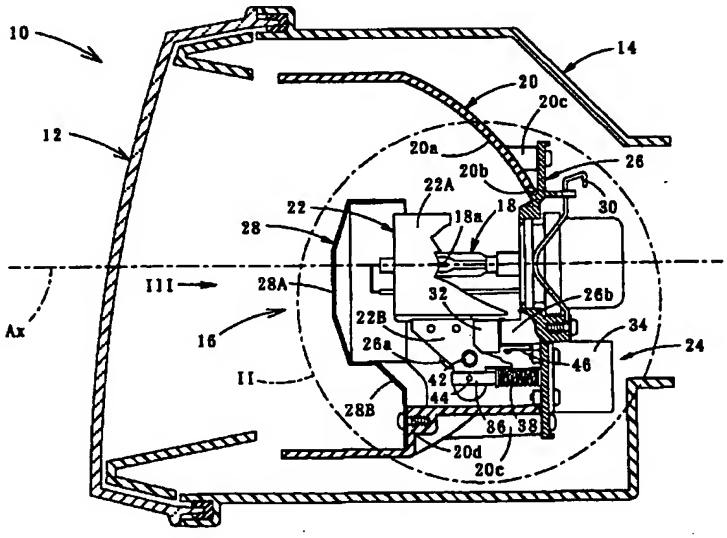
【図４】上記実施形態の第１変形例を示す、図１と同様の図

【図５】上記実施形態の第２変形例を示す、図１と同様の図

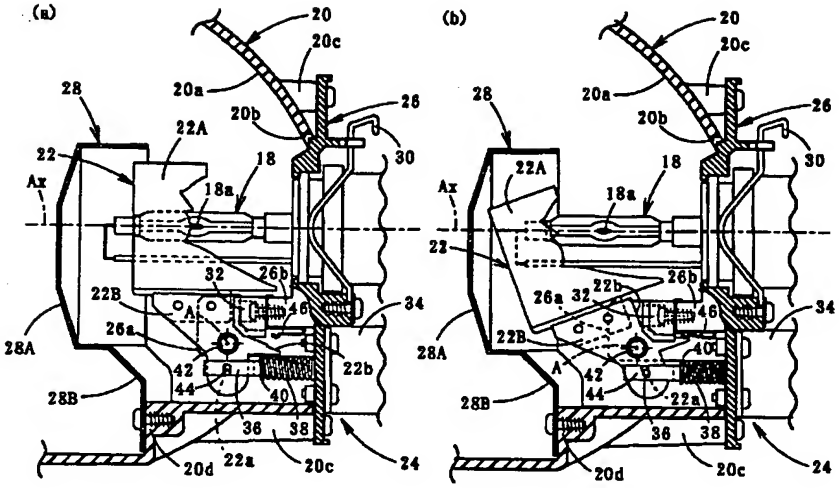
【符号の説明】

１０　車両用前照灯
１６　リフレクタユニット
１８　放電バルブ
１８ａ　放電発光部（光源）
２０　リフレクタ
２０Ａ　中心部（一部）
２０Ｂ　周辺部（残りの部分）
２０ａ　反射面
２０ｂ　後頂開口部
２０ｃ　ボス
２０ｄ　シェード固定用座部
２０ｅ　段部
２２　可動シェード
２２Ａ　シェード本体
２２Ｂ　ステー
２２ａ　長孔
２４　シェード駆動装置
２６　バルブ支持ベース
２６ａ　支持ブラケット
２６ｂ　突起部
２６ｃ　フランジ部
２８　固定シェード
２８Ａ　シェード本体
２８Ｂ　ステー
３０　線バネ
３２　変位規制ブロック
３４　ソレノイド
３６　可動鉄芯
３８　リターンスプリング
４０　Ｅリング
４２　軸部材
４４　ピン
４６　変位規制バネ
４８　環状スペーサ
Ａ　回転軸線
Ａｘ　光軸

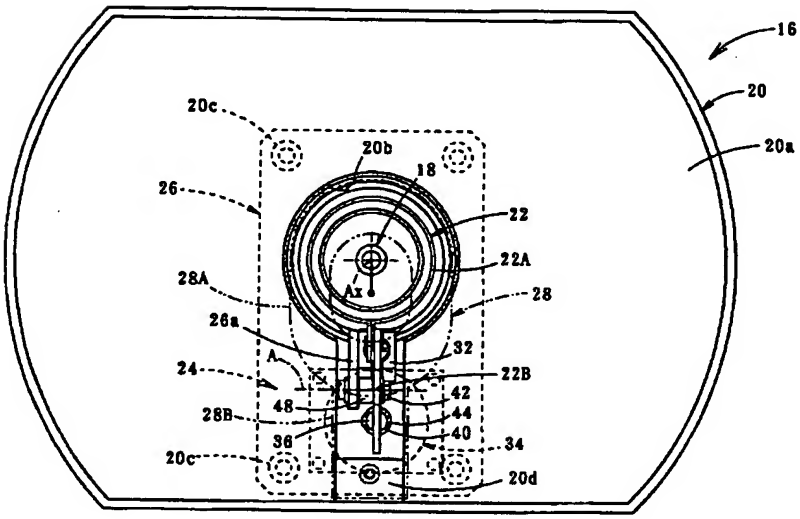
【図１】



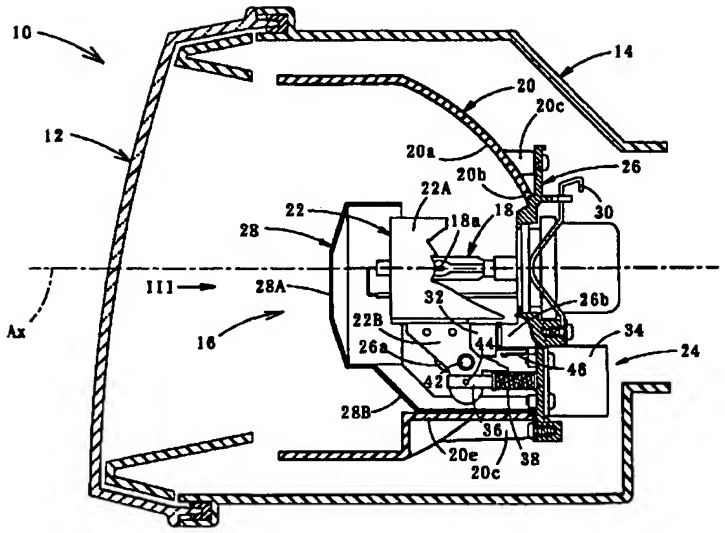
【図2】


(a)
(b)
20
20c
20a
20b
26
30
28
22A
22
18
18a
Ax
32
26b
22B
26a
A
46
34
28A
42
44
40
22b
28B
36
38
20d
22a
24

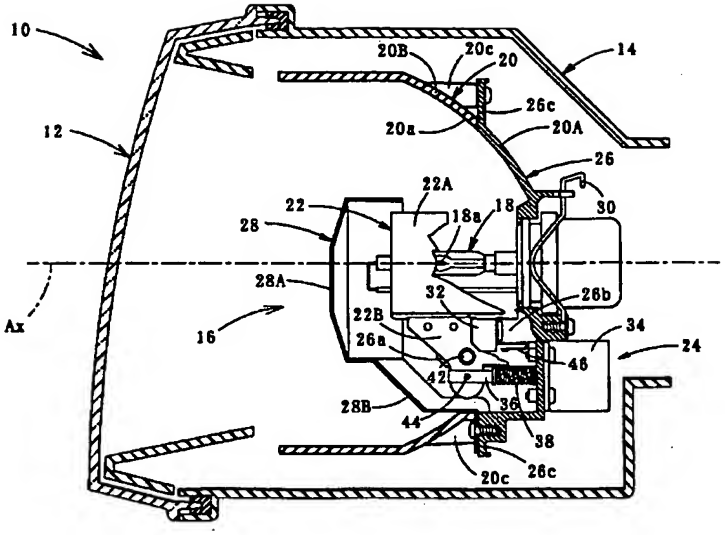
【図3】


16
20
20a
20c
20b
18
26
22
22A
28A
28
Ax
26a
A
32
24
22B
42
48
44
28B
40
36
34
20c
20d

【図4】


10
12
14
20
20c
20a
20b
26
22A
22
18
18a
30
28
III
28A
32
26b
Ax
16
22B
26a
44
34
24
42
46
28B
36
20e
20c
38

【図5】


10
20B
20c
20
14
26c
12
20a
20A
26
22A
22
18a
18
30
28
28A
32
26b
Ax
16
22B
26a
34
24
42
46
28B
44
36
38
20c
26c